Serial No.:

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Prior to examination of the above-referenced application, please amend the application as follows:

IN THE CLAIMS:

CLAIM AMENDMENT

1. (Original) A method of highly purifying a glass body, the method comprising:

applying voltages, in a nearly radial direction of said glass body, to at least a part in a longitudinal direction of a columnar or cylindrical glass body from at least one pair of electrodes placed on an exterior of an outer circumferential surface of the glass body.

2. (Original) The method of highly purifying a glass body according to claim 1, wherein said electrodes are plural anodes and plural cathodes arranged in a circumferential direction of said glass body, and wherein a potential of each of said anodes and a potential of each of said cathodes are respectively set.

3. (As Amended) The method of highly purifying a glass body according to claim 1 ~~or 2~~, wherein a relative swinging motion between said glass body and each of said electrodes occurs in a circumferential direction of said glass body.

4. (As Amended) The method of highly purifying a glass body according to claim 1 ~~one of claims 1 to 3~~, further comprising:

a surface removing process of removing a portion of the glass body extending from the outer circumferential surface inward to a predetermined depth after the voltages are applied to the glass body.

5. (As Amended) ~~A method of highly purifying a glass body, the method comprising:~~

~~when a cylindrical glass body is rotated around a central axis thereof used as a rotation axis at a rotational speed, which is equal to or more than 1 rpm and equal to or less than 100 rpm, applying voltages, in a nearly radial direction of said glass body, to at~~

~~least a part in a longitudinal direction of said glass body from electrodes disposed at an outer circumferential surface side and an inner circumferential surface side of said glass body.~~ The method of highly purifying a glass body according to claim 1, wherein the voltages are simultaneously applied to an entirety in a longitudinal direction of an effective portion of said glass body.

6. (As Amended) ~~The method of highly purifying a glass body according to claim 5, wherein the voltages are applied while said cylindrical glass body is rotated around the central axis to be used as a rotation axis at a rotational speed, which is equal to or more than 1 rpm and equal to or less than 20 rpm~~. The method of highly purifying a glass body according to claim 1, wherein the voltages are serially applied to said glass body in a longitudinal direction of the glass body.

7. (As Amended) ~~The method of highly purifying a glass body according to claim 5 or 6, further comprising:~~

~~a surface removing process of removing a portion of the glass body extending from an outer circumferential surface inward to a predetermined depth after the voltages are applied to the glass body, wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the inner circumferential side of said glass body to the outer circumferential side thereof.~~ The method of highly purifying a glass body according to claim 6, wherein while the voltages are serially applied to said glass body in a longitudinal direction of the glass body, portions, to which the voltages have been applied, are sequentially cooled.

8. (As Amended) ~~The method of highly purifying a glass body according to claim 5 or 6, further comprising:~~

~~a surface removing process of removing a portion of the glass body extending from an inner circumferential surface outward to a predetermined depth after the voltages are applied to the glass body, wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the outer circumferential side of said glass body to the inner circumferential side thereof.~~ The method of highly purifying a glass body according to claim 1, wherein a length in the longitudinal direction of said effective portion of said glass body is equal to or more than 500 mm.

9. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 8, wherein the voltages are simultaneously applied to an entirety in a longitudinal direction of an effective portion of said glass body.~~ A method of highly purifying a glass body, the method comprising:

when a cylindrical glass body is rotated around a central axis thereof used as a rotation axis at a rotational speed, which is equal to or more than 1 rpm and equal to or less than 100 rpm, applying voltages, in a nearly radial direction of said glass body, to at least a part in a longitudinal direction of said glass body from electrodes disposed at an outer circumferential surface side and an inner circumferential surface side of said glass body.

10. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 8, wherein the voltages are serially applied to said glass body in a longitudinal direction of the glass body.~~ The method of highly purifying a glass body according to claim 9, wherein the voltages are applied while said cylindrical glass body is rotated around the central axis to be used as a rotation axis at a rotational speed, which is equal to or more than 1 rpm and equal to or less than 20 rpm.

11. (As Amended) ~~The method of highly purifying a glass body according to claim 10, wherein while the voltages are serially applied to said glass body in a longitudinal direction of the glass body, portions, to which the voltages have been applied, are sequentially cooled.~~ The method of highly purifying a glass body according to claim 9, further comprising: a surface removing process of removing a portion of the glass body extending from an outer circumferential surface inward to a predetermined depth after the voltages are applied to the glass body, wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the inner circumferential side of said glass body to the outer circumferential side thereof.

12.(As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 11, wherein a length in the longitudinal direction of said effective portion of said glass body is equal to or more than 500 mm.~~ The method of highly purifying a glass body according to claim 9, further comprising:

a surface removing process of removing a portion of the glass body extending from an inner circumferential surface outward to a predetermined depth after the voltages are applied to the glass body, wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the outer circumferential side of said glass body to the inner circumferential side thereof.

13. (As Amended) ~~A method of highly purifying a glass body, the method comprising:~~

~~applying voltages in a longitudinal direction of a columnar or cylindrical glass body from electrodes placed on exteriors of a first end surface and a second end surface in a longitudinal direction of said glass body.~~

The method of highly purifying a glass body according to claim 9, wherein the voltages are simultaneously applied to an entirety in a longitudinal direction of an effective portion of said glass body.

14. (As Amended) ~~The method of highly purifying a glass body according to claim 13, further comprising:~~

~~an end portion removing process of removing a portion of the glass body extending from the second end surface of said glass body to the first end surface to a predetermined depth wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the first end surface to the second end surface of said glass body.~~

The method of highly purifying a glass body according to claim 9, wherein the voltages are serially applied to said glass body in a longitudinal direction of the glass body.

15. (As Amended) ~~The method of highly purifying a glass body according to claim 13 or 14, wherein a length in a longitudinal direction of an effective portion of said glass body is less than 500 mm.~~ The method of highly purifying a glass body according to claim 14, wherein while the voltages are serially applied to said glass body in a longitudinal direction of the glass body, portions, to which the voltages have been applied, are sequentially cooled.

16. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 15, wherein the voltages are applied without bringing said electrodes in contact with said glass body.~~ The method of highly purifying a glass body according to claim to 9, wherein a length in the longitudinal direction of said effective portion of said glass body is equal to or more than 500 mm.

17. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 15, wherein the voltages are applied in a state in which at least a part of said electrodes is brought into contact with said glass body.~~ A method of highly purifying a glass body, the method comprising: applying voltages in a longitudinal direction of a columnar or cylindrical glass body from electrodes placed on exteriors of a first end surface and a second end surface in a longitudinal direction of said glass body.

18. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 4 and claims 13 to 15, wherein the voltages are applied while heating a portion of said columnar glass body, to which the voltages are applied, to a temperature that is less than 1450 °C.~~

The method of highly purifying a glass body according to claim 17, further comprising:

an end portion removing process of removing a portion of the glass body extending from the second end surface of said glass body to the first end surface to a predetermined depth wherein a voltage gradient of the voltage is set to be a negative gradient in a direction from the first end surface to the second end surface of said glass body.

19.(As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 17, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is less than 1300 °C.~~ The

method of highly purifying a glass body according to claim 17, wherein a length in a longitudinal direction of an effective portion of said glass body is less than 500 mm.

20.(As Amended) The method of highly purifying a glass body according to claim 18 or 19, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C. The method of highly purifying a glass body according to claim 1, wherein the voltages are applied without bringing said electrodes in contact with said glass body.

21.(As Amended) ~~The method of highly purifying a glass body according to claim 18 or 19, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.~~ The method of highly purifying a glass body according to claim 9, wherein the voltages are applied without bringing said electrodes in contact with said glass body.

22. (As Amended) ~~The method of highly purifying a glass body according to claim 18 or 19, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.~~ The method of highly purifying a glass body according to claim 17, wherein the voltages are applied without bringing said electrodes in contact with said glass body.

23. (As Amended) ~~The method of highly purifying a glass body according to one of claims 1 to 22, wherein a content concentration of impurity cations contained in an effective portion of said glass body is decreased to equal to or less than 0.01 ppm by weight.~~ The method of highly purifying a glass body according to claim 1, wherein the

voltages are applied in a state in which at least a part of said electrodes is brought into contact with said glass body.

24.(As Amended) ~~A high purity glass body highly purified by the method of highly purifying a glass body according to one of claims 1 to 12, wherein an outside diameter of the glass body is equal to or more than 100 mm, and wherein a length of an effective portion is equal to or more than 500 mm.~~ The method of highly purifying a glass body according to claim 9, wherein the voltages are applied in a state in which at least a part of said electrodes is brought into contact with said glass body.

25. (As Amended) ~~A high purity glass body highly purified by the method of highly purifying a glass body according to one of claims 13 to 15, wherein an outside diameter of the glass body is equal to or more than 100 mm, and wherein a length of an effective portion is less than 500 mm.~~ The method of highly purifying a glass body according to claim 17, wherein the voltages are applied in a state in which at least a part of said electrodes is brought into contact with said glass body.

26.(As Amended) ~~The high purity glass body according to claim 24 or 25, wherein a content concentration of impurity cations contained in an effective portion of said glass body is equal to or less than 0.01 ppm by weight.~~ The method of highly purifying a glass body according to claim 1, wherein the voltages are applied while heating a portion of said columnar glass body, to which the voltages are applied, to a temperature that is less than 1450 °C.

27.(As Amended) ~~A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig~~

~~in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:~~

~~when said boring jig is brought into contact with said glass body, applying voltages, in a nearly radial direction of said glass body, to said glass tube from at least one pair of electrodes provided on an exterior of an outer circumferential surface of said glass body to thereby generate a voltage gradient.~~

The method of highly purifying a glass body according to claim 17, wherein the voltages are applied while heating a portion of said columnar glass body, to which the voltages are applied, to a temperature that is less than 1450 °C.

28.(As Amended) ~~A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:~~

~~when said boring jig is brought into contact with said glass body, applying voltages between said boring jig and an outer circumferential side of said glass body or between an inner circumferential side and an outer circumferential side of said glass tube to thereby generate a voltage gradient in a nearly radial direction of said glass body or said glass tube.~~

The method of highly purifying a glass body according to claim 1, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is less than 1300 °C.

29. (As Amended) ~~A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:~~

~~when said boring jig is brought into contact with said glass body, applying voltages, in a longitudinal direction of said glass tube, to said glass body from electrodes provided on exteriors of a first end surface and a second end surface in a longitudinal direction of said glass body to thereby generate a voltage gradient.~~

The method of highly purifying a glass body according to claim 9, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is less than 1300 °C.

30.(As Amended) ~~The method of manufacturing a glass tube according to one claims 27 to 29, further comprising:~~

~~after said glass tube is formed, removing at least an edge or peripheral portion of said glass tube at which the voltage gradient is set to be low.~~

The method of highly purifying a glass body according to claim 17, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is less than 1300 °C.

31. (As Amended) ~~An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body, said apparatus further comprising:~~

~~at least one pair of electrodes provided on an exterior of an outer circumferential surface of said glass body.~~ The method of highly purifying a glass body according to claim 26, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C.

32. (As Amended) ~~An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body,~~

~~wherein said boring jig is an electrode, and another electrode is provided on an outer circumferential side of said glass body, or wherein electrodes are provided on an inner circumferential side and the outer circumferential side of said glass tube.~~

The method of highly purifying a glass body according to claim 27, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C.

33. (As Amended) ~~An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body, said apparatus further comprising:~~

~~at least one pair of electrodes provided on exteriors of both end surfaces in a longitudinal direction of said glass body.~~

The method of highly purifying a glass body according to claim 28, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C.

34. (As Amended) ~~The apparatus for manufacturing a glass tube according to one of claims 31 to 33, wherein said boring jig is surface-treated and at least a part of the boring jig, which makes contact with said glass body, contains one of silicon carbide,~~

~~pyrocarbon, and metallic carbide.~~ The method of highly purifying a glass body according to claim 29, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C.

35.(New) The method of highly purifying a glass body according to claim 30, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 450 °C.

36. (New) The method of highly purifying a glass body according claim 26, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.

37. (New) The method of highly purifying a glass body according to claim 27, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.

38. (New) The method of highly purifying a glass body according to claim 28, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.

39. (New) The method of highly purifying a glass body according to claim 29, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.

40. (New) The method of highly purifying a glass body according to claim 30, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 600 °C.

41. (New) The method of highly purifying a glass body according to claim 26, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.

42. (New) The method of highly purifying a glass body according to claim 27, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.

43.(New) The method of highly purifying a glass body according to claim 28, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.

44. (New) The method of highly purifying a glass body according to claim 29, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.

45. (New) The method of highly purifying a glass body according to claim 30, wherein the voltages are applied while heating a portion of said glass body, to which the voltages are applied, to a temperature that is equal to or higher than 900 °C.

46. (New) The method of highly purifying a glass body according to claim 1, wherein a content concentration of impurity cations contained in an effective portion of said glass body is decreased to equal to or less than 0.01 ppm by weight.

47. (New) The method of highly purifying a glass body according to claim 9, wherein a content concentration of impurity cations contained in an effective portion of said glass body is decreased to equal to or less than 0.01 ppm by weight.

48. (New) The method of highly purifying a glass body according to claim 17, wherein a content concentration of impurity cations contained in an effective portion of said glass body is decreased to equal to or less
than 0.01 ppm by weight.

49.(New) A high purity glass body highly purified by the method of highly purifying a glass body according to claim 1, wherein an outside diameter of the glass body is equal to or more than 100 mm, and wherein a length of an effective portion is equal to or more than 500 mm.

50. (New) A high purity glass body highly purified by the method of highly purifying a glass body according to claim 9, wherein an outside diameter of the glass body is equal to or more than 100 mm, and wherein a length of an effective portion is equal to or more than 500 mm.

51. (New) A high purity glass body highly purified by the method of highly purifying a glass body according to claim 17, wherein an outside diameter of the glass body is equal to or more than 100 mm, and wherein a length of an effective portion is less than 500 mm.

52. (New) The high purity glass body according to claim 49, wherein a content concentration of impurity cations contained in an effective portion of said glass body is equal to or less than 0.01 ppm by weight.

53. (New) The high purity glass body according to claim 50, wherein a content concentration of impurity cations contained in an effective portion of said glass body is equal to or less than 0.01 ppm by weight.

54. (New) The high purity glass body according to claim 51, wherein a content concentration of impurity cations contained in an effective portion of said glass body is equal to or less than 0.01 ppm by weight.

55. (New) A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:

when said boring jig is brought into contact with said glass body, applying voltages, in a nearly radial direction of said glass body, to said glass tube from at least one pair of electrodes provided on an exterior of an outer circumferential surface of said glass body to thereby generate a voltage gradient.

56. (New) The method of manufacturing a glass tube according to claim 55, further comprising:

after said glass tube is formed, removing at least a peripheral portion of said glass tube at which the voltage gradient is set to be low.

57. (New) A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:

when said boring jig is brought into contact with said glass body, applying voltages between said boring jig and an outer circumferential side of said glass body or between an inner circumferential side and an outer circumferential side of said glass tube to thereby generate a voltage gradient in a nearly radial direction of said glass body or said glass tube.

58. (New) The method of manufacturing a glass tube according to claim 57, further comprising:

after said glass tube is formed, removing at least a peripheral portion of said glass tube at which the voltage gradient is set to be low.

59. (New) A method of manufacturing a glass tube by heating a columnar or cylindrical glass body to thereby soften said glass body, and then bringing a boring jig in contact with the softened portion of said glass body to thereby gradually form said glass body into a glass tube, the method comprising:

when said boring jig is brought into contact with said glass body, applying voltages, in a longitudinal direction of said glass tube, to said glass body from electrodes provided on exteriors of a first end surface and a second end surface in a longitudinal direction of said glass body to thereby generate a voltage gradient.

60. (New) The method of manufacturing a glass tube according to claim 59, further comprising:

after said glass tube is formed, removing at least an edge portion of said glass tube at which the voltage gradient is set to be low.

61. (New) An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body, said apparatus further comprising:

at least one pair of electrodes provided on an exterior of an outer circumferential surface of said glass body.

62. (New) The apparatus for manufacturing a glass tube according to claim 61, wherein said boring jig is surface-treated and at least a part of the boring jig, which makes contact with said glass body, contains one of silicon carbide, pyrocarbon, and metallic carbide.

63. (New) An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body,

wherein said boring jig is an electrode, and another electrode is provided on an outer circumferential side of said glass body, or wherein electrodes are provided on an inner circumferential side and the outer circumferential side of said glass tube.

64. (New) The apparatus for manufacturing a glass tube according to claim 63, wherein said boring jig is surface-treated and at least a part of the boring jig, which

makes contact with said glass body, contains one of silicon carbide, pyrocarbon, and metallic carbide.

65. (New) An apparatus for manufacturing a glass tube, said apparatus having a heating element disposed around a columnar or a cylindrical glass member, and also having a boring jig to be brought in contact with said glass body heated by said heating element, said apparatus forming said glass body gradually into a glass tube by contacting the boring jig to the glass body, said apparatus further comprising:

at least one pair of electrodes provided on exteriors of both end surfaces in a longitudinal direction of said glass body.

66. (New) The apparatus for manufacturing a glass tube according to claim 65, wherein said boring jig is surface-treated and at least a part of the boring jig, which makes contact with said glass body, contains one of silicon carbide, pyrocarbon, and metallic carbide.